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ART. XIX.—*Mineral Resources of Southern India.—No. 3. Chromate of Iron Mines: Salem District.* By LIEUT. NEWBOLD, F.R.S., &c., *Madras Army.*

(*Read* 19*th March,* 1842.)

THE chromate of iron mines of South India are situate near Curpúr, about four miles to the N.W. of Salem, a town which stands in lat. 11° 37′ N., and long. 78° 13′ E., among some hilly, jungly tracts at the S.W. base of the Shevaroy Hills.

Geognostic Position.—The Shevaroy Hills are composed principally of gneiss, alternating with hornblende and micaceous schists in highly inclined strata, through which granite is seen protruding at several points: they attain an elevation above the sea, ascertained by barometrical measurement, of 5260 feet. The principal rock composing the subordinate hilly tract in which the mines are situate is hornblende schist, alternating with micaceous and massive talcose schists, penetrated in numerous places by dykes of basalt, and layers of a magnesian rock analogous to serpentine, intersected by a complete net-work of veins of magnesite. I vainly endeavoured to trace a regular dip, or direction in these veins. In some, (*vide* Section) the chromate of iron is seen running in a continued vein, from a few lines to between three and four feet in thickness, but very irregularly, contracting suddenly in some places, and again widening in others. The ore, in other situations, is seen in detached nodules, and angular masses, embedded in the magnesite. One of these blocks weighed, according to the information of the miners, a couple of tons. The veins run more frequently along the sides of those of the magnesite than down their middle, but are not rarely observed penetrating and intersecting them, a circumstance indicating a posterior origin.

It is impossible, as mentioned before, to trace any general dip or direction to the mass of veins. The largest plunged at an angle of from 70° to 85° towards the S.S.W. The vein, on which the miners were at work at the time of my visit, was the largest that had been discovered; the greatest breadth being three feet six inches. The ore, however, was not thought much of by the miners being divided by numerous fissures, filled with thin seams of compact magnesite. The detached embedded masses were much freer from these fissures, and more esteemed. Besides the magnesite, nephrite and asbestus are found associated with the chrome ore, in thin layers between it and the embedding rock, and lining minute fissures. In geognostic position and age, it appears to assimilate the chromate of iron found in the serpentine rocks of the Shetlands, of Siberia, of Baltimore, and probably in those of Norway.

Mines.—The mines had been recently opened, when I saw them in March, 1840. They consisted of two open shafts, nearly close together, sunk through four or five feet of alluvium, and through the rock to the total depths of fifty-nine and sixty-three feet. Water was found in considerable quantity at the depth of fifty-nine feet, and had covered the floor of the deepest mine to the height of four feet. The men were engaged in removing it, with no better implements than ropes and buckets, and in opening a gallery of communication with the other mine. The mode of descent was by means of wooden ladders to successive floors.

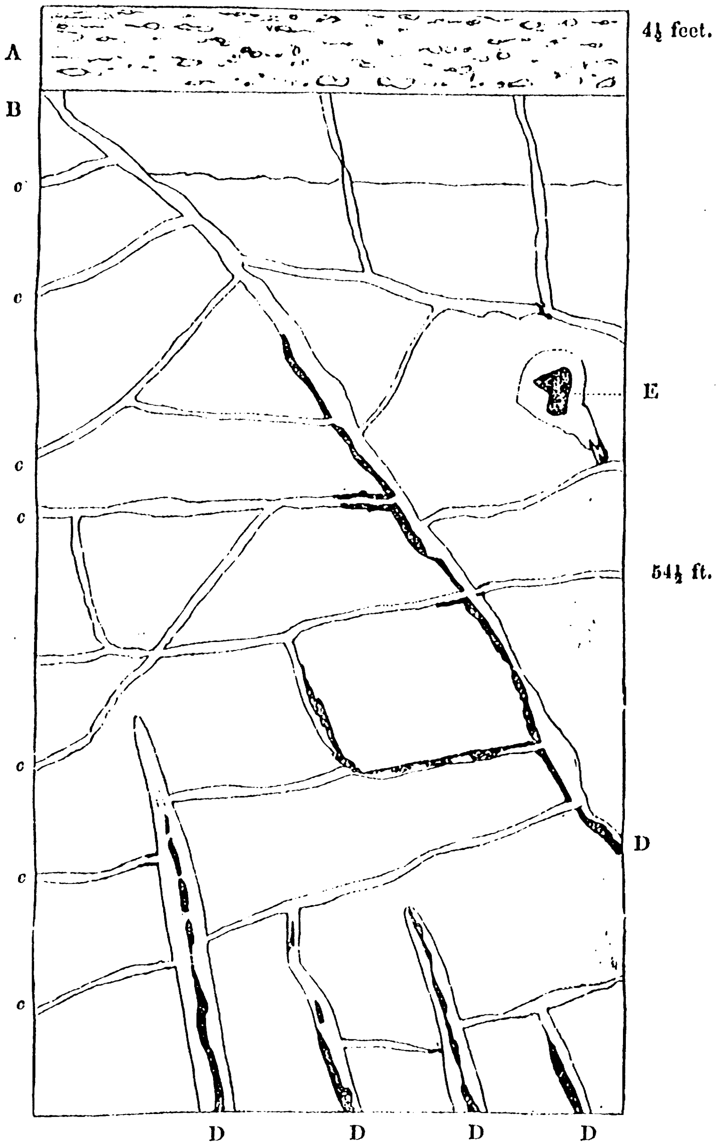
Ore.—The ore is not magnetic: it differs from that of Siberia in not being prismatic, though the minute microscopic fissures intersecting it often impart a pseudo-crystalline form readily discernible on striking and splitting some of the masses with the hammer. There are two varieties known to the miners,—the first is compact in structure; colour, purplish-iron black; lustre, imperfectly metallic: the second has a more brilliant lustre; colour, steel gray; with a granular semi-crystalline structure, and is said to yield the most chrome. The process of testing the ore, practised by the miners on the spot, is to reduce equal parts of it, and the nitrate of potash to powder; submit them mingled to calcination in a crucible; powder the residuum, and dissolve it in rain water, filter the solution, and precipitate with acetate of lead. They judge of the quality of the ore by the intensity of colour in the precipitated chromate of lead thus produced. The specimen I presented to the Royal Asiatic Society has been recently examined by Edward Solly, Esq., whose report is as follows:—"The chrome ore is the chromite of iron, (commonly called the chromate of iron): it is perfectly similar to the ore brought from the north of Scotland, America, and elsewhere. Its value will necessarily depend on the quantity in which it is procured, or rather on the expense of obtaining it, free from adhering earthy matters. A tolerably clear sample yielded me forty-nine per cent. of chromic oxide, (and this is about equivalent to fifty-seven per cent. of chromic acid, or 100 per cent. of chromate of potash). The ore is as good as can be desired, but the only question to be asked is, can it be readily obtained free from matrix or adhering earthy matters."

The ore is separated from the rock by means of pickaxes, chisels, wedges, and hammers: sorted, and piled up into little heaps on the ground in front of the huts occupied by the superintendents, where it remains until the Cauvery becomes navigable; that is, from the end of June till the end of September. It is then sent down by land to Moganoor, a place on the river, about forty miles southerly from Salem, whence it is boated to Porto-novo on the Coromandel coast. Thence it is shipped for Europe, by the Porto-novo Iron Company.

To Mr. Heath, I believe, the merit is due of the discovery of this valuable mineral. Mr. Fischer, of Salem, informed me that Mr. Heath communicated to him the circumstance of its having been found in the Salem district, and requested him to make every search for its sites. This was done for some time without success; but, at last, it was discovered accidentally by Mr. Fischer while in search of a wounded wild-fowl. I am sorry to add, that by late accounts from India, the mines now appear nearly exhausted; the first 100 tons of ore were got with facility, but at present doubts exist whether it can be procured at all; or, if so, whether the mines can be worked at a remunerating price, partly in consequence of the expense to be incurred in machinery and engines for steaming the water out.

I am informed that chromate of iron is also found associated with magnesite at Yedichicolum, on the Cauvery, near Trichinopoly, in a similar formation to that of Salem. If it exist there in any quantity, the site would be more advantageous than that of the latter for the facility of water-carriage. Indications of its existence are said to occur in the vicinity of Hoonsoor in Mysore, and near Comarpollium, ten or twelve miles south-west from Sankerry-droog, in the Salem district.

Section of Chrome Mine, Salem, 59 *feet deep.*



A, Alluvium overlying rock B. B, Magnesian rock.
c, c, c, c, c, c, c, c, Veins of magnesite; breadth exaggerated.
D, D, D, D, D, ditto of chromate of iron in the magnesite.
E, angular mass of chromate of iron embedded in magnesite.

For the discovery of chromate of iron in the serpentine rocks of the Shetland Isles, and on the Mainland of Scotland, we are indebted to Professor Jameson, and his pupil, Dr. Hibbert: in Norway to Essmark. From both countries it is exported; from Norway, until 1831, in the rough state to England, Holland, Russia, and Germany: but a company has been established at Drontheim for the purpose of supplying the cotton printers and porcelain manufacturers of these countries with prepared chrome, a more lucrative branch of trade than the export of the crude ore. It remains yet to be seen whether British India, whose neglected mineral resources are gradually being developed, will be able to compete with Norway in supplying Europe with this mineral, so useful in the arts.